FIG. 1

Directory of REs ~101

Retrieval Engine 1 ~102-1

Retrieval Engine 2 ~102-2

Internet/Intranet ~103

Retrieval Engine n ~102-n

RE Discovery ~104

Data Retrieval ~105

User ~110

FIG. 2

Retrieval Engine 1 — 202-1

Retrieval Engine 2 — 202-2

Directory of REs — 201

Internet/Intranet — 208

Data Retrieval — 203

Retrieval Manager — 204

RE Discovery — 206

User — 207

Data/Service Query — 205

single wafermap   **composite wafermap**

(a)   (b)

301
<u>scratch</u>
226 defects,
mechanical handling

<u>particle contamination</u>
617 defects,
CVD process contamination

defects detected with
optical in-line tools

302

FIG. 3

FIG. 4

501 Query semantic description

502 Repository semantic description

503 Matching procedure

504 Scored and ranked Repository description set

FIG. 5

Personalized categories from News Service

604

Matching procedure

603

Personal Profile description

601

News Service semantic description

602

FIG. 6

FIG. 7

Structure Matching 701

703 Strata

704 Spatial relationship

705 Rock1

706 Rock2

Example Matching 702

707 Classifier

708 Image

709 Image

examples of rock

710 EXAMPLE MATCHING

803

({Input Example 1},
{output label, score
set 1}),
({Input Example 2},
{output label, score
set 2}),
...

802

Classifier()

training
set

801

({Example set 1},
label 1),
({Example set 2},
label 2),
...

input data

804

{Input Example set}

FIG. 8

FIG. 9

Training Set

901

wheat

902

rye

Classifier

914

Input Data

911

oats

912

winter wheat

913

rye hybrid

oats -> nothing
winter wheat -> (wheat, 90 %,
                  rye,   5 %)
rye hybrid -> (wheat, 20 %,
                rye, 85 %)

FIG. 10

Repository
Classifier 1003

Fuzzy
Logic
Inference
Engine 1004

Query
Classifier 1006

training
set

input data

input data

training
set
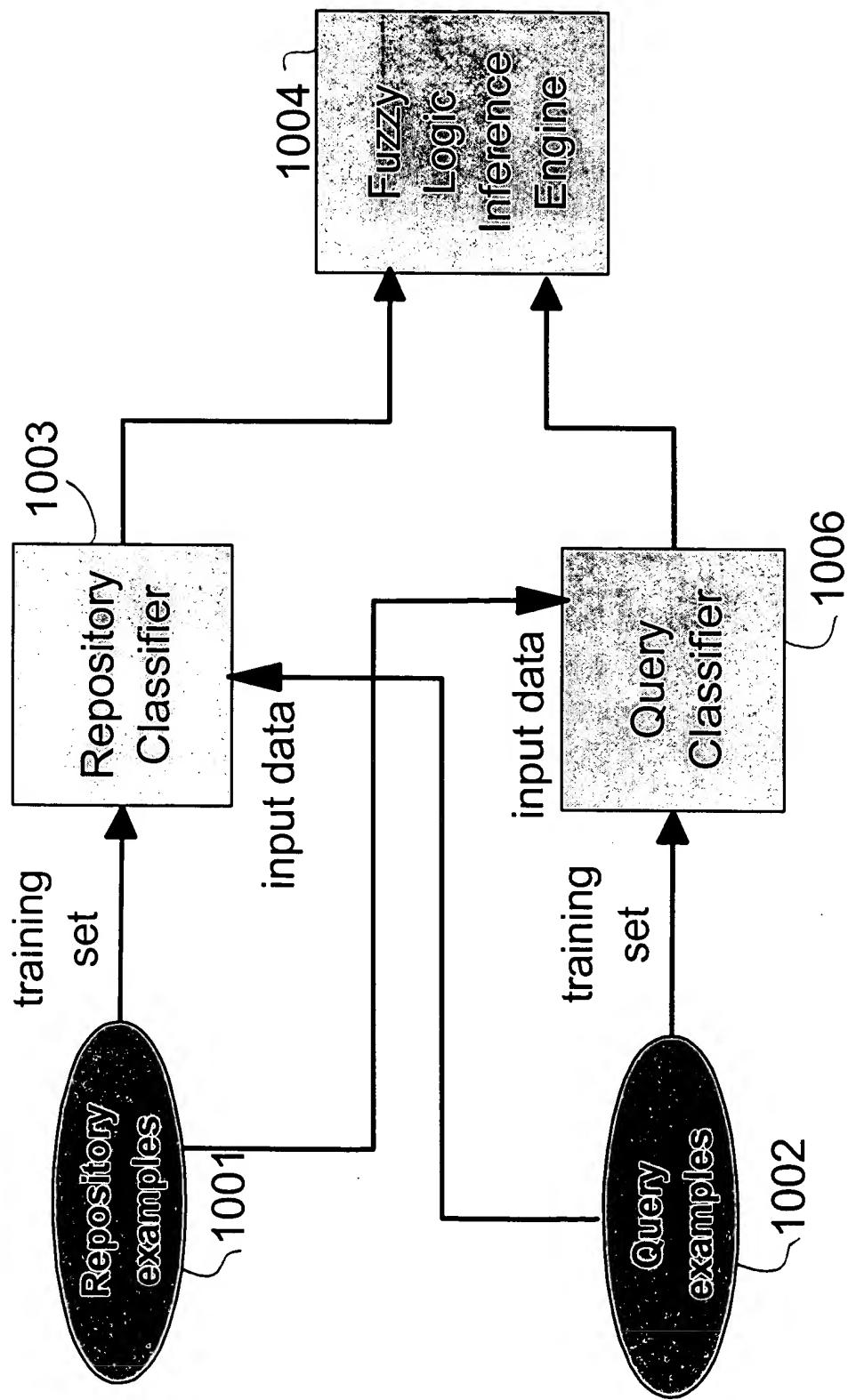
Repository
examples 1001

Query
examples 1002

Conclude:

Label 1 -> Label A,
fairly high probability,
Label B low probability

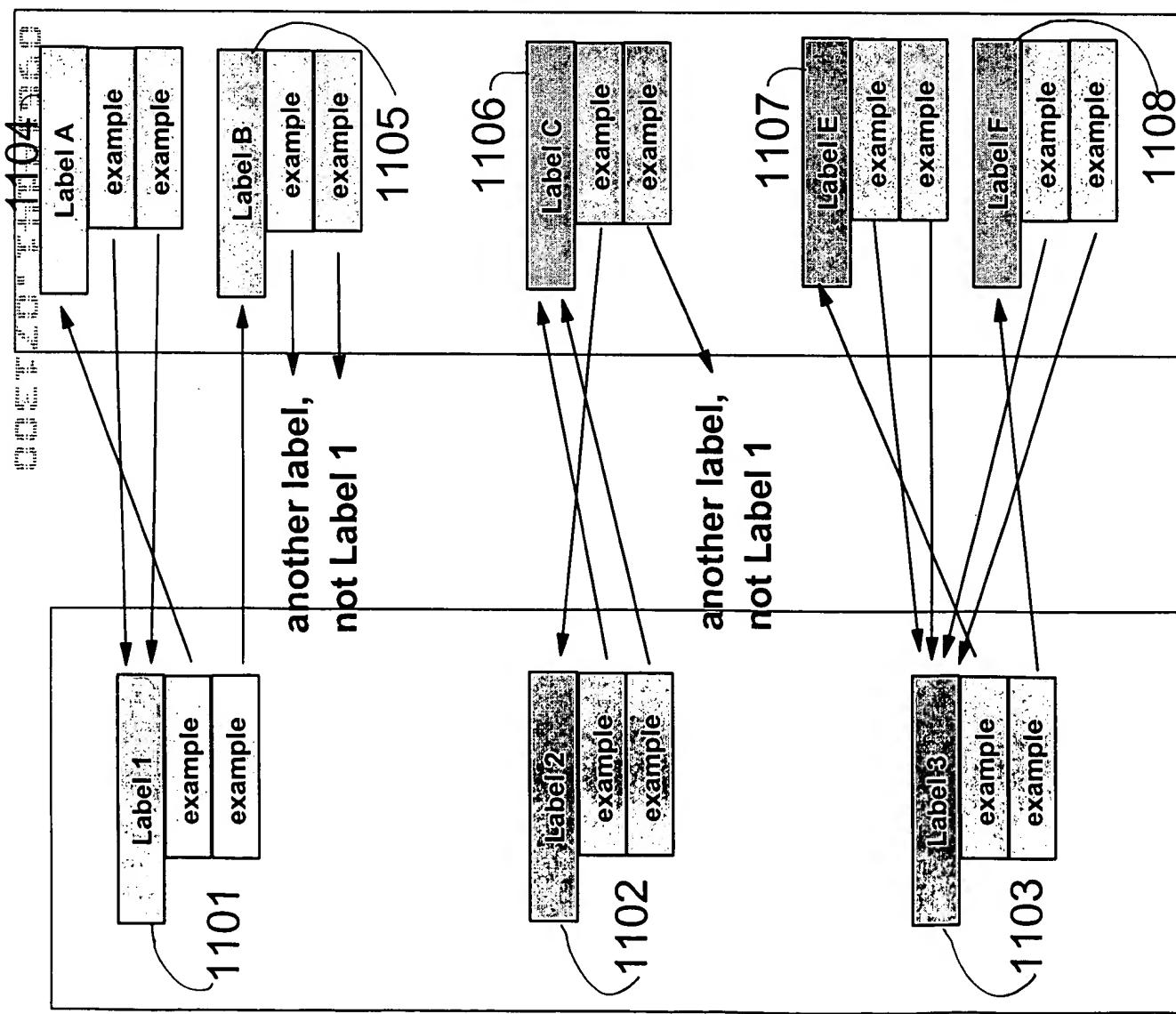1109

Conclude:
Label 2 -> Label C,
fairly high probability.

1110

Conclude:
Label 3 -> Label E or F
high probability

1111

Label A
example
example

Label B
example
example

1105

1106

Label C
example
example

1107

Label E
example
example

Label F
example
example

1108

repository vocabulary

another label,
not Label 1

another label,
not Label 1

Label 1
example
example

1101

Label 2
example
example

1102

Label 3
example
example

1103

query vocabulary

FIG. 11

search for:
"forest", "water"

— 1201

query

"forest" example set,
"water" example set

— 1202

training set

neural net classifier

— 1203

classifier

FIG. 12

class 1 definition

Example 1 ● ● ● Example m

class label 1

1301

1311

1312

1313

class 2 definition

Example 1 ● ● ● Example n

class label 2

1302

class X definition

Example 1 ● ● ● Example t

class label X

1303

FIG. 13

repository
class
definition 1   1403

repository
classifier   1404

repository labels
for query
examples   1406

query class
definition 1   1401

query
classifier   1402

query labels
for repository
examples   1405

FIG. 14

FIG. 15

1501 — forest example → trained classifier → "woods" - .95
"field" - .04
"lake" - .01 — 1511

1502 — forest example → trained classifier → "woods" - .83
"field" - .14
"lake" - .03 — 1512

1503 — water example → trained classifier → "woods" - .10
"field" - .01
"lake" - .89 — 1513

trained classifier — 1521

(A) Query examples cross-classified using repository classifier

Input label	Output label	Score
Forest	Woods	.95
Forest	Field	.04
Forest	Lake	.01
Forest	Woods	.83
Forest	Field	.14
Forest	Lake	.03
Water	Woods	.10
Water	Field	.01
Water	Lake	.89

example 1 — 1601
example 2 — 1602
example 3 — 1603

(B) Repository examples cross-classified using query classifier

Input label	Output label	Score
Woods	Forest	.97
Woods	Water	.03
Woods	Forest	.89
Woods	Water	.11
Field	Forest	.67
Field	Water	.33
Lake	Forest	.05
Lake	Water	.95

1604 — example 1
1605 — example 2
1606 — example 3
1607 — example 4

FIG. 16

1731 results combination module

1741 query to respository label translation

1703 match repository labels for query examples

1723 match query labels for repository examples

1702 repository classifier

1722 query classifier

1701 query class examples

1711 repository class examples

FIG. 17

Send examples, labels, and classifiers from client to repository

1801

Repository use received classifier to classify examples stored at the repository & generate confusion matrix 1

1802

Repository use its own classifier to classify examples received from the client & generate confusion matrix 2

1803

Cross match labels and generate "label association rules"

1804

FIG. 18

Generate Rules
from repository
vocabulary R to
query vocabulary
Q using matrix 1

~1901

Generate Rules
from query
vocabulary Q to
repository
vocabulary R
using matrix 2

~1902

Compute
association rule
confidence (i, J) =
confidence
(i-->J) *
confidence(J-->i)

~1903

Pruning of low
confidence rules

~1904

FIG. 19

matrix 1 (R -->Q)

	A	B
1	0.75	0.15
2	0.35	0.25
3	0.25	0.65

matrix 2 (Q -->R)

	1	2	3
A	0.65	0.15	0.10
B	0.15	0.25	0.6

(1,A)	0.75*0.65	0.4875
(1,B)	0.15*0.15	0.0225
(2,A)	0.35*0.15	0.0525
(2,B)	0.25*0.25	0.0625
(3,A)	0.25*0.1	0.025
(3,B)	0.65*0.6	0.39

FIG. 20

MEMORY ~ 2110

PROCESSOR ~ 2100

I/O DEVICES ~ 2120

FIG. 21